

ABSTRACT

A vertical cavity surface emitting laser (VCSEL) structure and fabrication method therefor are described in which a subsurface air, gas, or vacuum current confinement method is used to restrict the area of electrical flow in the active region. Using vertical
5 hollow shafts to access a subsurface current confinement layer, a selective lateral etching process is used to form a plurality of subsurface cavities in the current confinement layer, the lateral etching process continuing until the subsurface cavities laterally merge to form a single subsurface circumferential cavity that surrounds a desired current confinement zone. Because the subsurface circumferential cavity is filled with air, gas, or vacuum, the stresses
10 associated with oxidation-based current confinement methods are avoided. Additionally, because the confinement is achieved by subsurface cavity structures, overall mechanical strength of the current-confining region is maintained.